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AUTHOR Bowers, Patricia Greig
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ABSTRACT

A study examined the theory that partially independent deficits in phonemic awareness and symbol naming speed contribute to reading disability. Subjects of the study were chosen from six second-grade classrooms to represent poor and average readers, rather than a regular class distribution. On the basis of AAT (phonemic deletion scores) and DNS (digit naming speed) scores above and below the 35th percentile for each variable, there were 15 no deficit children, 9 children in each single deficit group, and 5 children with a double deficit. Results indicated that naming speed level was not associated with AAT scores nor was AAT level associated with naming speed scores. Grade 2 phonemic awareness level was significantly related to word identification and word attack in Grade 4, and naming speed levels tended to be related. Findings suggest that the level of early naming speed significantly predicts both speed and accuracy of text 2 years later, while level of early AAT did not. (Contains 6 tables of data.) (CR)

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Implications for Later Reading of a Naming Speed Deficit Accompanying a Phonemic Awareness Deficit

Paper presented to SSSR
San Francisco
April 1995

By

Patricia Greig Bowers
University of Waterloo

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Implications for later reading of a naming speed deficit accompanying a phonemic awareness deficit

Patricia Greig Bowers

University of Waterloo

Maryanne Wolf and I have pursued the idea that partially independent deficits in phonemic awareness and symbol naming speed contribute to reading disability. Data in support of that hypothesis has involved demonstrating that even when variance in verbal ability and phonemic awareness is controlled, naming speed accounts for additional variance predictive of reading accuracy and reading speed. For example, the unique variance in Grade 4 reading due to Grade 4 phonemic deletion scores (AAT) and digit naming speed (DNS) when both are entered into regression equations is shown in Table 1.

In an attempt to concretize such results, I have previously reported the various reading scores for a sample of children divided into four subgroups based upon their Grade 4 scores on tests of phonemic awareness and naming speed. Less attention has been paid to the implications of the various subgroups for prognosis and remediation. Tonight I will sketch the Grade 4 reading outcomes of children who were categorized as members of these 4 groups not when they were in Grade 4 but when in Grade 2.

The Grade 2 sample were chosen from six classrooms to represent poor and average readers rather than a regular class distribution.On the basis of AAT and DNS scores above and beow the 35th percentile for each variable in this sample (Table 2), there were 15 no deficit children, 9 children in each single deficit group, and 5 children with a double deficit. The single deficit groups are those with good phonemic awareness but slow symbol naming, a group similar to that studied by Maureen Lovett and called "rate disabled", and 2) those with poor phonemic awareness but fast symbol speed. These latter children are the most surprising subtype for phonological-core theories of disability, since it implies that speed cannot be primarily an effect of phonological skill.

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ANOVA demonstrated that naming speed level was not associated with AAT scores nor was AAT level associated with naming speed scores. The goal of analyses was to observe the later reader status of each of the groups after a two year period of regular instruction. WISC-R Vocabulary scores were not significantly associated with either factor in ANOVA, but the pattern of scores was such that ANCOVA, controlling for Vocabulary, was used to disambiguate results, since in this sample, the single phonemic deficit children had slightly lower Vocabulary scores and the double deficit children had slightly higher scores than the other two groups (Table 3). Results without the covariate were similar to those with Vocabulary controlled, but significance levels were stronger. Grade 2 factors defining subgroups were associated with Grade 2 Woodcock Word Identification and Word Attack scores. Which variable is more related to later reading status, initial naming speed, initial phonemic awareness, or their conjunction?

Grade 2 phonemic awareness level was significantly related to Word Identification and Word Attack in Grade 4, and naming speed level tended to be related. What is most striking is the effect of additive deficits, such that the double deficit child continues to be most affected while single deficit children are only moderately poor readers or even average readers by the time they reach Grade 4.

Data were available for recognition of high frequency words in Grade 3 and moderately frequent words in Grade 4 (Table 4). Again, Analysis of Covariance indicated that level of naming speed had significant effects upon the number of words identified correctly in either grade. Only for the moderately frequent words did AAT level also affect accuracy of words. (Table 5): Grade 2 naming speed level was highly predictive of latency to pronounce regular and exception words identified correctly in Grade 3 and regular words in Grade 4; AAT level was not predictive of speed for any word category.

Finally (Table 6), measures of speed and accuracy of text reading in Grade 4 were analyzed. Interestingly, it is again the level of early naming speed which significantly predicts both speed and accuracy of text two years later, while level of early AAT did not.

Perhaps we should focus upon the phonological only deficit group and the double deficit group to get a sense of the added prognostic value which slower naming speed brings to the picture of low phonemic analysis (Table 2). While both groups had very low ability to analyze words into phonemes in Grade 2, they both mastered this skill to the level of the Grade 2 average AAT group by Grade 4. The groups continued to differ in naming speed in Grade 4, with the double deficit group about at the level of the phonemic only deficit group in Grade 2. The children with single phonemic deficits certainly did not become skilled readers, but they did better in Grade 3 and 4 than the double deficit group, not only in speed of reading but also in accuracy measures (Table 4). This is especially true when adjusting scores for the covariate. Without such adjustment, the double deficit and phonemic only deficit group appear somewhat less distinct, but this seems a function of oral vocabulary knowledge rather than naming speed. Among the children with a single phonemic deficit, children with higher verbal ability do not fare badly in later reading, while those with lower verbal ability do less well, although still somehat better than those with high verbal ability and double deficits.

Recent studies reported by Lovett, by Wood, and by Scarborough have indicated that naming speed measures add important prognostic information in samples of severely disabled readers. My study along with earlier data of Wolf, indicate that within regular classrooms, early identification of children who are apt to continue to be poor readers can be accomplished by a combination of measures of phonological skill and serial symbol naming speed. Is there anything in this data that can guide remediation efforts? There are hints single deficit children in a regular classsroom may not need as intensive remediation as double deficit children. One might speculate that if the single phonemic deficit group were to be given training in phonemic awareness and phonic skills during the early grades, quicker as well as better progress might be seen. For the single speed deficit children, the prescription is less clear cut. When identified in regular classrooms, they seem to increase their skill on standardized reading measures to an acceptable level over time, but to lag

behind in fluency and more sensitive measures of word knowledge. Extra practice such as that used in Betty Ann Levy's studies might increase their fluency to a more acceptable level. Our most intensive and creative interventions must be devised for the more intractable group, those with a double deficit.

Table *1*

Level of significance of the beta coefficient for Auditory Analysis Test and Digit Naming Speed when both are in the regression equation.

	Auditory Analysis	Digit Naming Speed
WRMT Word Identification [a]	**	*
WRMT Word Attack [a]	***	*
WRMT-R Passage Comprehension [b]	**	ns
Moderate frequency regular words [c]		
Accuracy	*	**
Latency for correct (log transformed)	ns	***
Moderate frequency exception words [c]		
Accuracy	*	**
Latency for correct (log transformed)	ns	*
Passage reading [d]		
Accuracy	ns	*
Speed (words per minute)	ns	***

a Woodcock Reading Mastery Test (Woodcock, 1973) subtest

b Woodcock Reading Mastery Test (Woodcock, 1987) subtest

c From Lovett, Ransby and Barron (1988) list of moderate frequency words

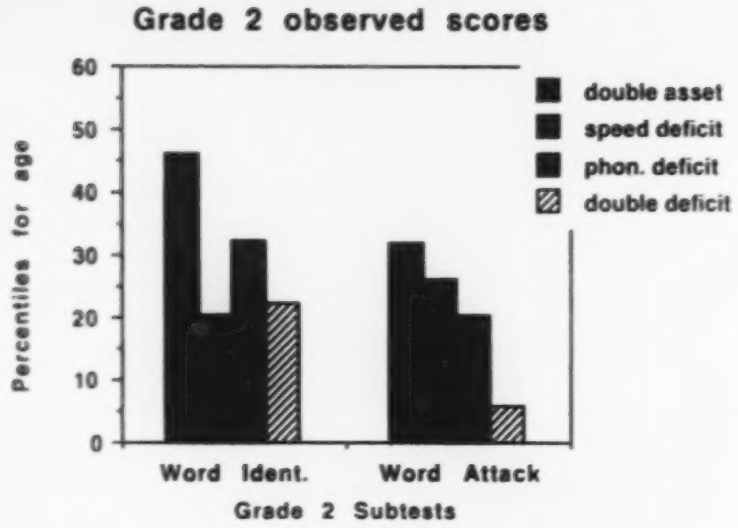
d Based on 100 word passages adapted from Science Research Associates (1976); children read somewhat different passages (better readers had harder passages) but the reading level of the passages was not associated with naming speed or phoneme deletion.

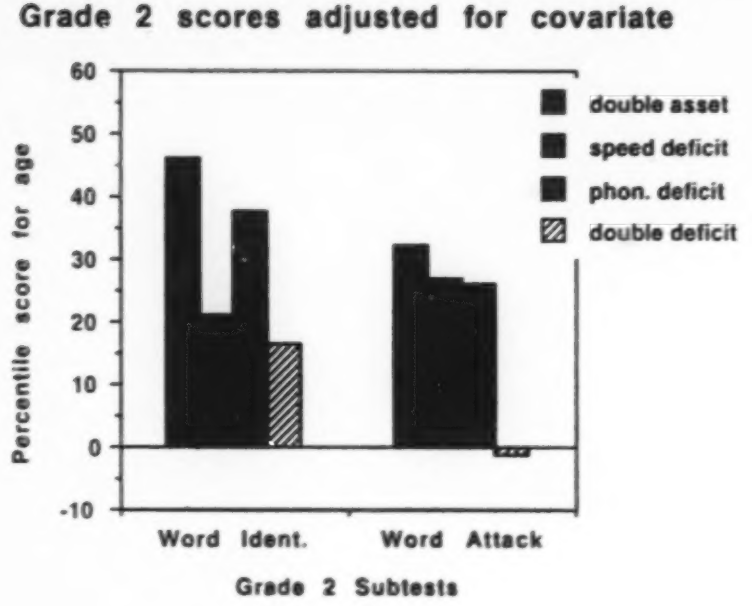
*** $p < .001$; ** $p < .01$; * $p < .05$

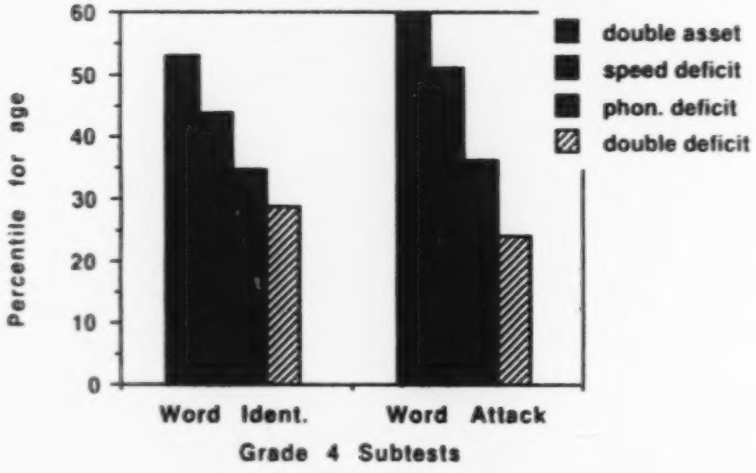
Subgroups based upon Grade 2 scores on phonemic awareness (number correct on Auditory Analysis Test, AAT) and serial naming speed (items per second on Digit Naming Speed, DNS).

	Auditory Analysis Test	
	Average	Poor
Digit Naming Speed		
	n = 15	n = 9
Average Speed	AAT = 11.4	AAT = 1.33
(Items/sec.)	DNS = 1.74	DNS = 1.67
	Vocab = 11.2	Vocab = 9.6
	n = 9	n = 5
Slow Speed	AAT = 8.1	AAT = .6
(Items/sec.)	DNS = 1.13	DNS = 1.25
	Vocab = 11.1	Vocab = 13.2

Table 3


Grade 2 observed scores
Percentiles for age
60
50
40
30
20
10
0
double asset
speed deficit
phon. deficit
double deficit
Word Ident.
Word Attack
Grade 2 Subtests


Grade 2 scores adjusted for covariate
Percentile score for age
60
50
40
30
20
10
0
-10
double asset
speed deficit
phon. deficit
double deficit
Word Ident.
Word Attack
Grade 2 Subtests


Grade 4 observed scores
Percentile for age
60
50
40
30
20
10
0
double asset
speed deficit
phon. deficit
double deficit
Word Ident.
Word Attack
Grade 4 Subtests

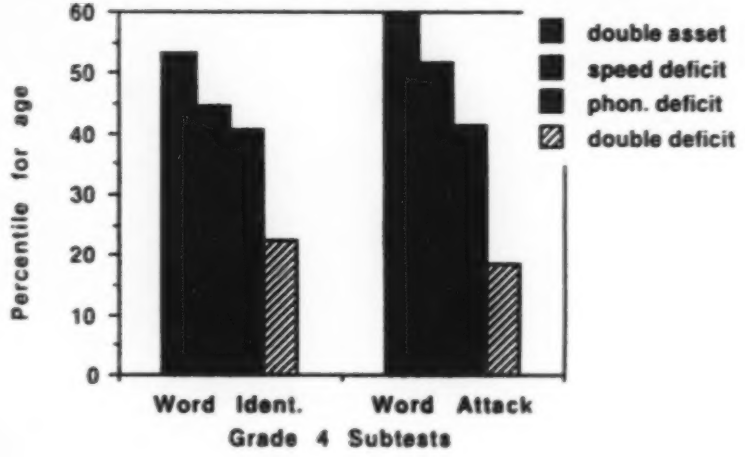
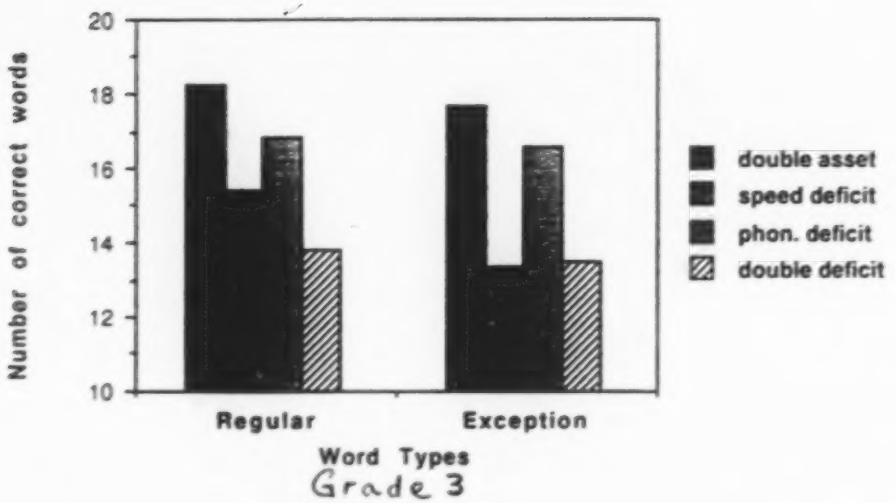
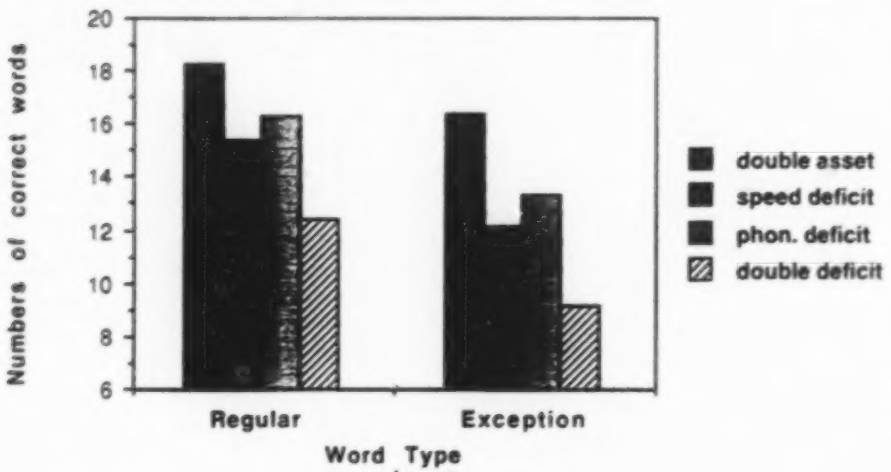

Grade 4 scores adjusted for covariate
Percentile for age
60
50
40
30
20
10
0
double asset
speed deficit
phon. deficit
double deficit
Word Ident.
Word Attack
Grade 4 Subtests

Table 4

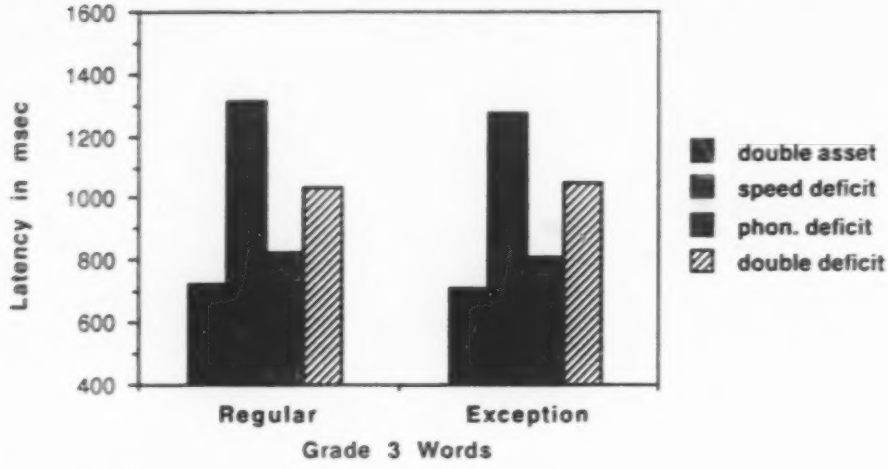


Grade 3



Grade 4

Table 5


1600
1400
1200
1000
800
600
400
Latency in msec
Regular
Exception
Grade 3 Words
double asset
speed deficit
phon. deficit
double deficit

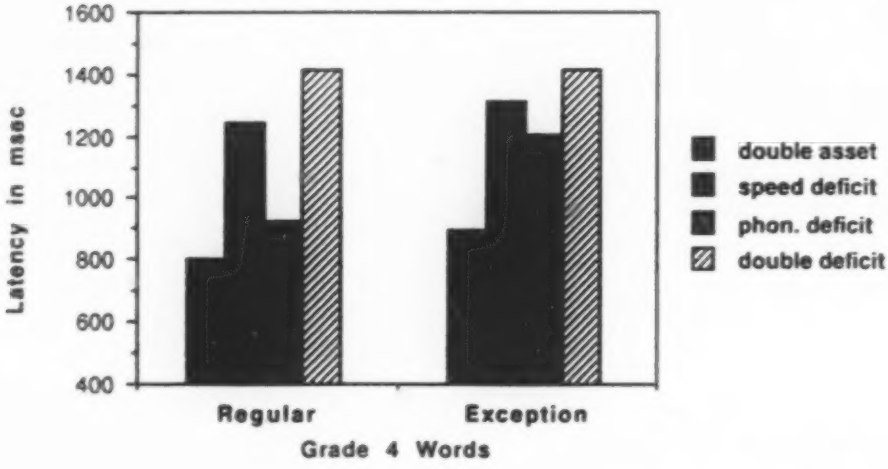
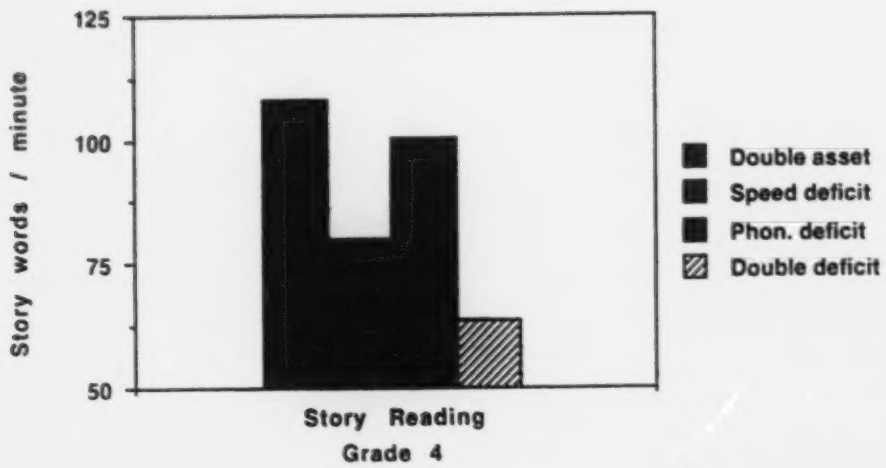
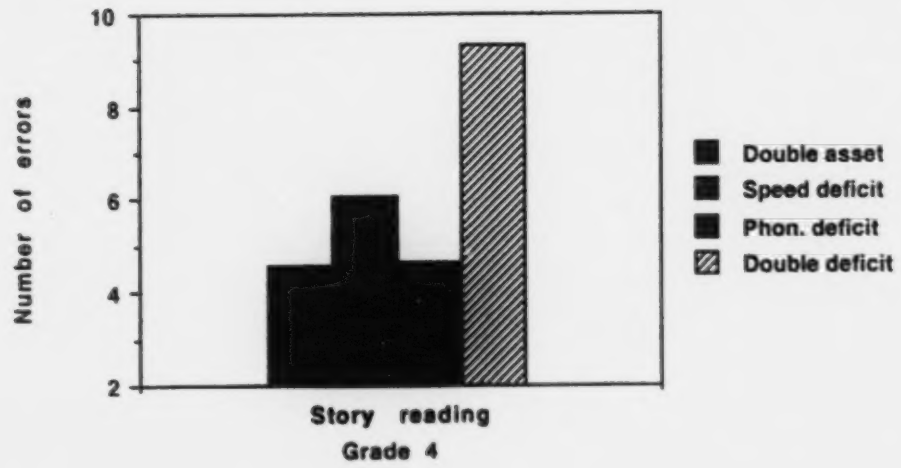

1600
1400
1200
1000
800
600
400
Latency in msec
Regular
Exception
Grade 4 Words
double asset
speed deficit
phon. deficit
double deficit

Table 6


125
100
75
50
Story words / minute
Story Reading
Grade 4
Double asset
Speed deficit
Phon. deficit
Double deficit


10
8
6
4
2
Number of errors
Story reading
Grade 4
Double asset
Speed deficit
Phon. deficit
Double deficit